IN THE

Supreme Court of the United States

October Term, 1971

No. 71-485

ROBERT GOTTSCHALK, COMMISSIONER OF PATENTS,
Petitioner

v.

GARY R. BENSON and ARTHUR C. TABBOT,
Respondents

ON WRIT OF CERTIORARI TO THE UNITED STATES COURT OF CUSTOMS AND PATENT APPEALS

BRIEF AMICUS CURIAE FOR APPLIED DATA RESEARCH, INC. (ADR)

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BRIEF AMICUS CURIAE FOR APPLIED DATA RESEARCH, INC. (ADR)

Applied Data Research, Inc. (hereinafter ADR) files this brief amicus curiae in opposition to Petitioner, together with letters of consent of the parties in accordance with the Rules of the Court.

QUESTIONS PRESENTED

Whether a computer system formed by the addition of software programming to a general-purpose digital computer (hardware)[1] is a machine structurally different from that of the hardware.

Whether the process performed by the software-hardware combination is a machine process.

1. This brief is based on and adopts the definitions and technical discussion of the ADAPSO/AISC Brief, and this brief may best be considered subsequent to that ADAPSO/AISC Brief.

INTEREST OF AMICUS CURIAE

ADR was incorporated in 1959 and since then has been a small business engaged in the computer field in the marketing of various computer services and proprietary software products. ADR presently markets six software products and has been awarded two software patents, one of which was the first patent[2] issued for a software product on the market. This product AUTOFLOW is currently and prominently the most successful standardized software product on the market, and it has received the widest distribution except for those software products distributed "free" [3] by IBM.

ADR is interested in filing additional patents on its innovative developments in the computer programming field, and is concerned with the implications of this case

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2. U. S. No. 3,533,086 of Martin A. Goetz, issued October 6, 1970 for "Automatic System for Constructing and Recording Display Charts."

The other ADR patent is U. S. No. 3,380,029 of Martin A. Goetz, issued April 23, 1968 for "Sorting System." The issuance of this patent received considerable publicity as a so-called "first software patent." Actually, this patent was the first one that was *candidly* presented as implemented by software programming. Prior to that, hardware companies had obtained such patents by the stratagem (called Fabian Strategy by the Patent Office Solicitor) of presenting the invention as though implemented by hardware programming, not by software. One example of such a patent is U. S. No. 3,339,182, "Optimum Result Computer" of IBM. The use of this stratagem by the hardware manufacturers and its recognition by the Patent Office and others manifest the common understanding of the engineering equivalence of the software and hardware technologies.

3. The ADAPSO/AISC Brief documents the IBM marketing procedure for the so-called "free" software, the price of which is surreptitiously incorporated in the hardware price.

Since the IBM "free" software is supplied to all interested customers, it tends to saturate the potential market. Thus, it is difficult to compare the marketing success of ADR's software products, which are priced and face competition, with IBM's.

for the patents currently held by ADR and patents that it wishes to acquire in the future.[4]

ADR is a manufacturer of special-purpose computers based on software programming, which software is intended for use with standard general-purpose computers, or hardware, available from hardware manufacturers such as IBM. Though ADR is a small business, it can engage in such a manufacturing business, due to the nature of the technology, and successfully compete in an open market with the giant hardware manufacturers such as IBM. The latter also markets software programming, though its principal business is nominally (as a reflection of its hardware pricing strategy) the manufacture of computers based on hardware programming.

The following information reflects ADR's experience in developing and marketing its software products: The initial cost to develop a software product ranges between $50,000 and $500,000. As an average, about $200,000 per product is usually invested. The annual cost to service, maintain and enhance each product is about equal to the development costs. ADR has invested about 1 million dollars in the development and maintenance of AUTOFLOW. It usually takes 1 to 2 years to develop a product to the point where it is marketable. At least 1 year on the market is required before the number of sales for a particular product reaches a satisfactory level in terms of profitability. Software products are expected to remain marketable for at least 5 years, and must be continually improved to stay competitive during that period. Certain software products, however, may be useful for as many as 10 years or more. The obsolescence factor is more dependent upon the lifespan of the hardware on which a software product is operational than on the functioning of the software program itself. In summary, large investments must be made prior

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4. ADR has no interest in any patent that may issue on the Benson and Tabbot application.

to marketing a software product, and continuing investments are required throughout its marketable life-span.

Petitioner and the supporting hardware manufacturers and their association, BEMA, oppose patents for software implemented inventions on the grounds that software programming is merely a "mental process," as though it had a certain ephemeral character, a non-physical or non-machine character.[5] Knowing that it is not in the "mental process" business but in a machine business, as are all of its competitors, both hardware and software manufacturers, ADR seeks to illustrate for the Court some salient features of the computer business.

ADR is concerned that the BCD-to-binary converter of Benson and Tabbot is not representative of software programming, and that, by this single example, a misleading picture has been presented to the Court, and erroneous conclusions have been drawn therefrom by the amici hardware manufacturers. ADR therefore hereinafter sets forth some examples of the variegated software technology.

The C.C.P.A. findings of fact in prior cases[6] are implicit in the present case. They are: 1) that general-purpose hardware is structured by software into a special-purpose computer, and the structure of this special-purpose machine is different from that of the general-purpose machine and is determined by the inserted software, and 2) that hardware and software forms of programming are engineering equivalents. Once the facts are recognized, the patentability of the special-purpose machine follows directly from the statutory provision that machines are patentable subject matter. The briefs of Petitioner and the hardware manufacturers do not deny these findings of fact,

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5. See Jacobs, "Patentable Machines—Systems Embodiable in Hardware or Software (The Myth of the Non-Machine)," Proc. Law of Software, 1968, p. B-77, Geo. Wash. Univ. Natl. Law Center.

6. *In re Prater*, 415 F. 2d 1393 (1969); *In re Bernhart*, 417 F. 2d 1395 (1969); *In re Mahony*, 421 F. 2d 742 (1970); *In re Musgrave*, 431 F. 2d 882 (1970); *In re Foster*, 438 F. 2d 1011 (1971).

but by predicating their attack against the patentability of software programming on "mental process," the hardware manufacturers are indirectly attacking these findings and are, in effect, seeking their reversal by this Court.

SUMMARY OF ARGUMENT

The technological facts as well as the interests of all of the amici curiae on both sides of this case reveal that the real issue is that of patents for machines and machine processes in the field of computers or automatic data processing—and not patents for "mental processes" or mathematics. These facts include:

1. The facts of the opposing economic interests of competitive hardware and software companies in the computer industry;

2. The facts of the computer technology, both hardware and software, which are illustrated by a number of examples; and

3. The facts of this case concerned with a process for the conversion of BCD to binary.

The examples of hardware and software technology illustrate the engineering equivalence of software and hardware, the adequacy of the search and classification facilities for both, and the suitability of defining the invention for either technology as a machine or a machine process.

ARGUMENT

A. *Software programming is a machine device.*

1. The economics of the computer industry, as well as the opposing economic interests of the competitive companies in the computer industry, demonstrate that the real issues involved in this case are machines and machine processes, and not "mental processes."

The software side, or sub-industry, of the computer industry is itself a multi-billion dollar business for "automatic data processing." The hardware manufacturers' argument about "mental processes" and ideas seeks to perpetuate a myth of the non-machine.[7] These legal arguments stand in strong contrast to their advertised claims for superior machine construction and operation due to the software.[8] The multi-billion dollar business is predicated on software programming which directs the operation automatically of stored-program general-purpose hardware to produce "extended machines." Without soft-

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7. See Jacobs, *supra* note 5.

8. See a current Burroughs advertisement in 227 Scientific American 2, July 1972, in which Burroughs sells its machines (hardware and software) with the claims of "More powerful and productive computer systems" that offer, inter alia, "A comprehensive library of program products for major savings in program development time and related costs" and of "A more powerful and productive master control program" that "increases throughput 10 to 20% . . . [and] confirms Burroughs leadership in control program technology." See also the news article, "Burroughs' Wide Ride With Computers," Business Week, July 1, 1972, pp. 54-58.

A current IBM announcement (in the Wall Street Journal, August 3, 1972, pp. 43, 49) of its new machine technology also stresses the machine character of the software in offering its product for sale: "System 370 virtual storage is created by circuitry and advanced programming that link slower but far less costly peripheral disk storage to main storage in the computer." Certainly, it is not a "mental process" that, together with circuitry, does the *linking* of the disk storage to the main storage.

ware programming, there would be no use for the general-purpose hardware,[9] but with software, the computer industry has developed.

Although it is almost impossible for a small software company to compete successfully against IBM's "free" software products, ADR has done so with its AUTOFLOW product for which it has a patent. ADR's software product AUTOFLOW is directed to an automatic system for developing flowcharts of software programming without human intervention. The system that ADR competed with when it placed AUTOFLOW on the market in 1965 was one offered "free" by IBM to its customers. The IBM FLOWCHART[10] system for the IBM/360 hardware was not a fully automatic system, since the programmer was himself compelled to sketch manually a rough draft flow diagram of the software programming that he wished to chart. With records of this rough draft, the IBM FLOWCHART software was used to control the hardware to operate in the nature of a drafting machine to draw a finished flowchart. Unlike the IBM "free" software, ADR's AUTOFLOW is fully automatic, so that the layout of the flowcharting is "planned" automatically, and thereafter the flowchart is automatically completed.

In marketing its AUTOFLOW product, ADR found the potential IBM/360 market totally saturated with IBM's flowcharting program. ADR initially experienced considerable resistance on the part of IBM computer users against paying for a flowcharting program when they got one "free" from IBM. ADR was compelled to invest heavily in educating the market as to the difference between the semi-manual system of IBM and the fully automatic system of ADR, even though IBM's semi-manual flowcharting was

9. This point has been made in the industry with some slight overstatement by the suggestion to one who sought some criteria for evaluating such general-purpose hardware sans software to call in a junkman, who would ask simply, "What does it weigh?"

10. See IBM Technical Newsletter, System/360 FLOWCHART, No. N 20-0069-0 Sept. 12, 1966.

not competitive, neither technically nor in the final flowchart that was achieved. ADR was ultimately successful in the marketing of its product, in one of the first and few instances of such successful competition with IBM's "free' software.

Without reasonable prospects of obtaining a patent, ADR would have been confronted with the situation that IBM could use the concepts of the AUTOFLOW system (for which a patent was finally granted) and develop a system similar to AUTOFLOW and give it away "free." Were that to have happened, ADR's AUTOFLOW business would have been destroyed. ADR has sold or leased more than 1500 units of its AUTOFLOW software product, with gross sales of about 10 million dollars.

The hardware manufacturers such as the amici curiae supporting Petitioner have obtained patents for their hardware programming developments; these are the products they price in the bundle of hardware and software that they sell. However, the hardware manufacturers do not wish to be restrained in any way by software patents that companies such as ADR may obtain; for such patents would enable small software companies, as in the case of AUTOFLOW, to enter into competition with the hardware manufacturers even as against the "free' software.

Thus, the software business, in every respect, is concerned with the sale and use of automatic machines and not with "mental processes."

2. The facts of the technology and the findings of fact of the C.C.P.A. in this case and in its predecessor cases are that a programmed digital computer is a special-purpose computer or machine, and the process it performs is a machine process, not a "mental process."

These C.C.P.A. findings of fact[11] that software is a machine device which structures the general-purpose hardware are not denied by Petitioner nor by the hardware

11. See *Prater* and *Bernhart*, *supra* note 6.

manufacturers. Instead, arguments are made that since the process can be understood mentally, and in principle performed mentally, therefore it must be a "mental process." Such argument flies in the face of the entire purpose of the computer program technology, which serves solely to provide machine processes and machine devices and is not concerned with mental processes in any way, certainly not in a business way.

The processing of data by a human being, the "mental process," (which, when performed by pencil and paper, is a manual process) in some cases bears at most superficial resemblance to the machine process of automatic data processing, just as manual sewing with needle and thread only superficially resembles sewing with a sewing machine. That the "workstuff"[12] of automatic data processing is "data," the same as manual data processing, does not make the automatic process a manual process nor a "mental process."

The following examples of a variety of automated machine systems implemented by software (those of ADR's two software patents and two others) are illustrative of machine processes that are quite different from the human "mental process."

(a) *AUTOFLOW Flowcharting System.* One unique feature of the software technology is the capability of making "decisions," which has led to the mistaken impression that computers "think." This "decision" feature reveals that a computer program is *not* (except in a trivial sense) merely a sequence of hardware operations (or "instructions"). In practice, a program is made up of many interrelated sequences of operations. It is not like the player piano that invariably plays the same sequence of chords directed by the holes in the piano roll. The "decision"[13]

12. *In re Benson and Tabbot*, 441 F. 2d 682, 687.

13. The term "decision" is a rather pretentious one to describe a machine control operation or "selection" which controls processing to follow one of a number of alternative paths of operation. The criteria for selection are the intermediate results of data processing.

capability enables the program to jump from one sequence to another and back again, depending on the results of the processing of the data at different stages. Thus the sequences of operations vary with the nature of the data being processed.[14]

The alternative paths of data processing resemble a maze with an almost infinite number of alternative choices. For example, if there are 50 specific decision points, the number of possible paths is 2^{50} or over one trillion choices (and more than 50 decision points are common within programs). The control of data as it passes through the logical maze is not a function of the hardware, as is commonly believed (the hardware performs each of its command operations in the same way for any program), but rather a function of the particular software that directs the hardware. The variable sequence of operations uniquely defines a special-purpose computer.

These multi-directional mazes of alternative paths of processing flow of nearly any large or small program are charted automatically by the AUTOFLOW system (see the Appendix)[15] which cannot "think" and which therefore does not know if it is flow-charting a sorter program, a program for analyzing printed characters (e.g. to read and sort mail in a post office), a program for synthesizing voice (so that the blind can receive communications from a com-

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The technical jargon in the computer field, which is often quite anthropomorphic in suggesting human characteristics where none exists draws upon the only available terminology that we have, and uses existing words with special machine meanings. The hardware manufacturers' arguments about "mental processes" are largely and speciously based on this anthropomorphic terminology.

14. See Jacobs, supra note 5, for a discussion of an equivalent hardware technique corresponding to the software "decisions" for producing alternative paths of processing.

15. In the Appendix, a photograph of a small segment of a flowchart is shown being produced by a computer printer under control of AUTOFLOW. The diamond-shaped blocks in the flowchart are the "decision" points whence flow two or more alternative paths of processing.

puter), or any of a large variety of other programs that a computer center may have (for directing its single set of hardware). The data processing paths of AUTOFLOW are themselves configured in a complex multi-directional maze.

The AUTOFLOW patent,[16] therefore, is directed to a process which in no sense duplicates a mental or manual process. The Government, one of the most enthusiastic customers of AUTOFLOW, has encouraged its use because it is *not* like a manual or mental process: ". . . manually drawn flowcharts often reflect what the programmer intended to have the program do rather than what he coded it to do. By the use of AUTOFLOW, computerized flowcharts are produced which precisely describe what the programmer has coded."[17] Thus, AUTOFLOW employs a *unique* process which is designed to employ the operational characteristics and equipment of the general-purpose computer hardware with which it operates, but to overcome the hardware's limitations and achieve the desired flowcharting in a useful form by practical means. This process is clearly not a mathematical[18] nor a "mental" process.

(b) *ADR's Sorter Patent.* A second ADR patent[19] is concerned with the most common (at least in the commercial field) form of automatic data processing, that of sorting data (e.g. placing machine records in numerical or alphabetical sequence). In the sorting system of ADR's patent, strings of records are recorded on magnetic tapes which can be "read" or "played back" only when moving in the forward direction.

The sorting is performed on strings of records on successive tapes, followed by merging the sorted strings of records of those tapes and storing the merged records

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16. See *supra* note 2.

17. Goddard News, Public Information Office of the Goddard Space Flight Center, NASA, Dec. 12, 1966, pp. 3, 7.

18. At ADR, in the development of software products, the special mathematical skills of mathematicians are not used.

19. See *supra* note 2.

on a tape. The next set of records is similarly sorted and merged, and so on until the tapes all have merged strings of records, whereupon they are merged and stored on one tape. This alternating between sorting and merging is repeated until all of the records are sorted. The patent shows that this sort-merge operation is a very efficient one where the magnetic tapes can be read while moving in one direction only, and the rewinding of tapes occurs during time periods when its records are not needed for sorting or merging.

The subject matter of the patent is a sorting machine (which preferably is embodied in software) and the process of that machine. Data sorted by a "mental process" would, by no stretch of the imagination, ever be subjected to the data process described in the ADR sorter patent. The entire purpose of the patented system is to perform operations at high speed, at millionths and thousandths of a second, and to manipulate the tapes in a certain way to overcome their limitations of being read in one direction only. The process is clearly neither mathematical nor "mental."

(c) *Recognition of Printed Characters.* Many machine systems have been developed and new ones continue to be developed for automatic reading of printed documents. The machines for this purpose consist of: 1) an input device (e.g. an optical sensor) for detecting electrical signals corresponding to the patterns of black and white print that form a printed symbol, 2) an analyzer for processing the patterns of any signals to identify the symbol, and 3) an output device (e.g. a printer or a control device).

A machine process for analyzing signals to identify numerals or the letters of the alphabet is not the human mental process for reaching the same result, nor is it a mathematical process. The character recognition analyzer may take a wide variety of forms, independent of the types of input and output devices, and it may be embodied either in software or hardware or some combination of software and hardware, depending on various engineering consid-

erations. Generally, hardware is faster, but it suffers from the disadvantages of requiring a larger investment to tool up for mass production, and it may be too expensive for more complex systems.

The software approach for the character recognition analyzer is more flexible and permits a company to build a machine and to test it out before finalizing the hardware design. In addition, the company can place the machine on the market in the software form for commercial use, and be able readily to modify, enhance and debug it as field use develops. As this technology developed, the machine analysis (for example, for hand print) became more complex and, at least initially, was implemented by software.

In any of these cases, the hardware and software forms of a character recognition analyzer may be essentially the same in all material aspects, since the hardware and software forms are engineering equivalents. The machine and its process would be generally the same whichever form of programming, hardware or software, were used. From the standpoint of patent protection, it should make no difference which engineering form is chosen by a company. Hardware manufacturers such as IBM have for many years obtained patents for their character recognition analyzers, which they market in hardware form. Under the C.C.P.A. decisions, a small company should be able to obtain a patent for an innovative character recognition analyzer which initially is embodied in software form, and which subsequently, by the small company or by a hardware manufacturer, may be embodied in hardware form.

The "mental process" of recognition is, of course, distinctly different from the machine process of character recognition equipment. Any patent obtained on such equipment or its process, we know, would not cover a "mental process" nor mathematics.

(d) *Voice Assembly.* Digital computer techniques have been developed for assembling speech from pre-

recorded syllables in which parts of words are stored in a computer memory, and a special-purpose computer is used to assemble complete words and transmit them to a human operator (e.g. in a bank, in response to an inquiry about a depositor's bank balance, or a blind man's request for data from a computer data bank). Such a special-purpose computer may be implemented by software programming for a general-purpose computer, or by hardware programming, or by an appropriate combination of the two. The particular form of embodiment, hardware or software, would not affect the machine character of the system and the machine process that it would perform. In neither case would the patent cover mathematics or a "mental process" (that is, a human process for the assembly of speech).

Summary. In each of these examples of machines (an automatic flowcharter, a sorter, character recognition equipment, voice assembly equipment) the hardware may be the same (e.g. the hardware of any of the hardware manufacturers). The hardware is uniquely structured by the software of these widely different machines as required, without rewiring the hardware and without otherwise changing the hardware or its basic operations. In each of these cases, it is clear, not only is there a machine process distinctly different from a human "mental process," but any patents on these systems would not cover mathematics or prevent the human performance of any "mental process." This is especially clear in the ADR AUTOFLOW and Sorter patents, where the inventions are defined in the claims as machines, rather than machine processes.[20]

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20. In accord with the engineering equivalence of software and hardware, is the C.C.P.A. holding in the *Prater* and *Bernhart* cases, supra note 6, that it is appropriate to define the invention as a machine in patent claims using the statutory claim form specified in 35 USC 112. The 1966 Patent Office Guidelines to the Examination of Computer Programs, 829 O.G. 1, 2, Aug. 2, 1966, also acknowledge the suitability of defining software as a machine de-

3. The facts of this case deal only with machines and machine processes, not with "mental processes."

The BCD-to-binary converter of this case has utility solely in a digital computer device. This method of conversion has no practical use outside of such a computer, and neither the Petitioner nor the supporting hardware manufacturers have suggested any. The performance of this conversion manually or "mentally" by a human as suggested in the briefs of Petitioner and the hardware manufacturers is merely for explanation to the Court of the conversion process.

The BCD code is used solely for digital equipment; for example, for human-operated input devices such as a keyboard or human-read output devices such as a printer, which serve as an interface between a digital computer system and a human operator. Humans generally work with decimal numbers, while the computer operates in binary numbers. Therefore, a conversion from one to the other is required. This conversion is always performed in and automatically by a machine, whether by software or hardware programming.

Any patent to issue on this invention would cover a machine process only. Had the subject matter of this case come before the Court as an infringement suit against IBM or one of the other hardware manufacturers as defendant, which made, used and sold a Benson and Tabbot converter, the defensive cry to the patentability of that converter on the grounds of "mental process' would be a strange one

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Note —Continued

vice in this fashion. This procedure was followed by ADR in its patents for AUTOFLOW and the Sorting System.

The question of defining software-embodied inventions as machines did not arise before the C.C.P.A. in this case, and the only claims now before the Court are process claims. The machine form of claims would, of course, not be infringed by a "mental process," and is, therefore, not in issue.

when the infringement[21] took the singular form of a machine process.

B. *The search and classification facilities for inventions embodied in software are substantially the same as for those embodied in hardware, and they are adequate.*

An understanding of the search facilities for software implemented technology may be appreciated from experience with the examples discussed above. In the ADR AUTOFLOW patent, seven articles from technical and computer science journals[22] bearing on automatic flowcharting using software were cited and made of record. Thus it is seen that for many years technical journals and proceedings of technical conferences in the industry have provided a valuable source of technical literature of this

21. Software users would face no unusual business risks as a consequence of software patents. If the software were supplied by the hardware manufacturer, those manufacturers would be responsible for the infringement just as they are for the hardware that they market.

ADR's AUTOFLOW patent was obtained to protect the company's enterprise and enable its entry into the marketplace. Other companies besides IBM market flowcharting software products that are not covered by the AUTOFLOW patent. They would know of that patent if they considered imitating AUTOFLOW. It is unlikely that any computer user would build his own flowcharting system or use in-house when he could buy it at moderate cost from ADR. For practical reasons, such individual infringers would not be prevented from doing so by ADR, which would only be concerned with a substantial infringement.

22. Three of the articles came from "Communications of the Association for Computing Machinery," 1959, 1963 and 1965, respectively, two others of the articles came from "Proceedings of Fourth Annual Meeting of UAIDE" (a 1965 software conference), another article came from the "Proceedings of the Western Joint Computer Conference" (1959), and the seventh came from "The Proceedings of the Association for Computing Machinery Conference," 1965.

developing technology of software. Such journals also provide a source of bibliographies, abstracts, reviews and classification indices of the technology, as would be expected, for those who work in this advanced technology.[23] These examples expose the falsity of any suggestion that there is a dearth of technical literature in this field.

In the ADR patent for the "Sorting System," seven patents were made of record by the Patent Office, as well as an article from the "Conference Proceedings" of the American Federation of Information Processing Societies, 1964. The seven patents are directed to hardware forms of sorting. The patent search files on sorting machines are very well developed in the Patent Office, and the technical literature on software versions of sorting systems is also very much available.

As noted above, sorting may be done by hardware or by software, or by some combination of the two, and sorting systems initially developed for software implementation may subsequently be implemented in hardware form. Therefore, the Patent Office, in order to examine patent applications involving hardware-implemented sorting inventions, requires technical facilities for the software technology as well as that of the hardware.

The Patent Office has extensive collections of patents and articles from technical journals dealing with machine systems for the recognition of printed characters. The implementation of such systems, and particularly the analysis portion thereof, by software or hardware would generally be in the same classification and require similar searches. Voice assembly systems implemented in hardware have been patented for many years, and in more

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23. See, for example, *Computing Reviews* of the Association of Computing Machinery for technical reviews and abstracts and classified indices and bibliographies thereof; *Computer and Information Systems* for "abstracts of the literature of information processing" classified by subject matter; *Transactions on Computers* of the Institute of Electrical and Electronic Engineers for "abstracts of current computer literature" classified by subject matter.

recent years the use of both software and hardware for implementing such systems has resulted in the filing of patent applications for both types. Their examination would be quite similar whether implemented in software or in hardware.

Thus, adequate search and classification facilities are available for machines implemented either in software or hardware, and common facilities are needed for both in view of their engineering equivalence.[24]

CONCLUSION

The findings of fact and conclusions of law of the Court below are soundly based, and its decision should be affirmed.

Respectfully submitted,

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24. As recognized by IBM, ". . . in some respects computer programs and hardware are interchangeable; hence one can say that a new computer program is similar to a new machine." Galbi, "Proposal for New Legislation to Protect Computer Programming," 17 Bull., Copyright Soc'y 280, 281.

APPENDIX

AUTOMATIC FLOWCHARTING WITH PATENTED ADR AUTOFLOW SYSTEM